1 Declaration

This Record of Decision (ROD) presents the Selected Remedy for Operable Unit (OU) 6, Site 12 at Marine Corps Air Station (MCAS) Cherry Point, North Carolina. MCAS Cherry Point was placed on the National Priorities List (NPL) December 16, 1994 (EPA ID: NC1170027261). The remedy was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record for the site. Information not specifically summarized in this ROD or its references but contained in the Administrative Record[1] has been considered and is relevant to the selection of the remedy at OU 6. Thus the ROD is based upon and relies upon the entire Administrative Record file in making the decision.

The Navy, Marine Corps, and the United States Environmental Protection Agency (USEPA) jointly selected the remedy for Site 12, with the concurrence of the North Carolina Department of Environment and Natural Resources (NCDENR). The Navy provides funding for site cleanups at MCAS Cherry Point. The Federal Facility Agreement (FFA) for MCAS Cherry Point documents how the Navy and Marine Corps intend to meet and implement CERCLA in partnership with USEPA and NCDENR.

OU 6 is one of nine OUs that have been identified at the Air Station. CERCLA environmental investigations began in 1983 with an Initial Assessment Study. Additional investigations and remedial actions are ongoing. The Site Management Plan (SMP) for MCAS Cherry Point further details the schedule for CERCLA remediation activities and is updated annually. This ROD documents the final remedial action for Site 12 and does not include or affect any other sites at the facility.

1.1 Selected Remedy

The response action selected in this ROD is necessary to protect the public health, welfare, and the environment from actual or threatened releases of contaminants from the site. The response action for Site 12 addresses a tar-like layer identified in the subsurface soil that is considered a source of contamination to groundwater, and the potential unacceptable human health risk associated with potential for potable use of the groundwater. A CERCLA action is required to return the aquifer to beneficial use because the groundwater is a potential source of drinking water and Maximum Contaminant Levels (MCLs) have been exceeded. The remedy consists of excavation and off-site

[1] **Bold blue text identifies detailed site information available in the Administrative Record and listed in the References Table. This ROD is also available on CD whereby bold blue text serves as a hyperlink to referenced information. The excerpts referenced by the hyperlinks are part of the ROD.**

disposal of contaminated soil, monitored natural attenuation (MNA) for groundwater, and land use controls (LUCs) to restrict groundwater use. The estimated time to achieve performance standards is not expected to exceed five years. The Selected Remedy meets the statutory requirements and is protective of human health and the environment, complies with Federal and State regulations that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. Because this remedy will result in pollutants or contaminants remaining on-site in groundwater above levels that allow for unlimited use/unrestricted exposure (UU/UE), a statutory review will be conducted within five years after the initiation of remedial action to ensure that the remedy is protective of human health and the environment.

1.2 Data Certification Checklist

The following are among the factors considered in selecting the remedy for Site 12:

- Chemicals of concern (COCs) and their respective concentrations (Sections 2.3 and 2.5).
- Baseline risk represented by the COCs (Section 2.5).
- Cleanup levels established for COCs and the basis for these levels (Sections 2.5 and 2.7).
- Principle threat wastes (Section 2.6).
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater (Section 2.4).
- Potential land and groundwater use that will be available at the site as a result of the Selected Remedy (Section 2.9.3).
- Estimated capital costs, annual operation and maintenance (O&M), and total present-worth costs; discount rate; and the number of years over which the remedy cost estimate is projected (Table 5).
- Key factors that led to selecting the remedy (i.e., a description of how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (Section 2.9.1).

If contamination posing an unacceptable risk to human health or the environment is discovered after execution of this ROD, the Navy will undertake all necessary actions to ensure continued protection of human health and the environment.

1.3 Authorizing Signatures

F. P. Bottorff
Colonel, U.S. Marine Corps
Commanding Officer
MCAS Cherry Point

18 Sept 06
Date

The North Carolina Department of Environment and Natural Resources concurs:

Dexter R. Matthews, Director
Division of Waste Management
NCDENR

9-22-06
Date

Beverly H. Banister, Acting Director
Waste Management Division
USEPA – Region 4

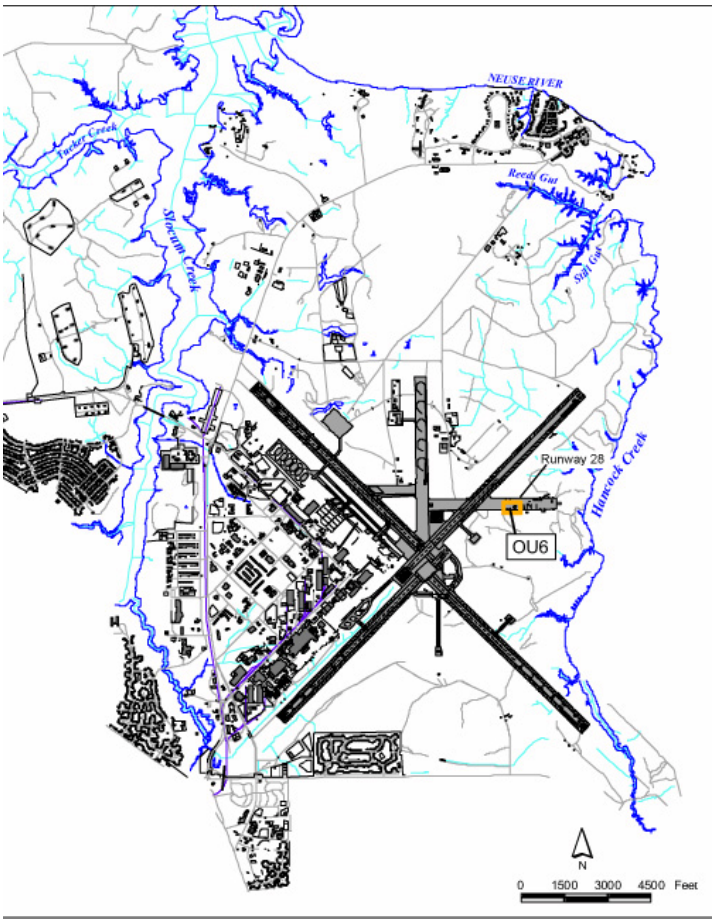
9-28-06
Date

2 Decision Summary

2.1 Site Description and History

MCAS Cherry Point is a 13,164-acre military installation located in southeastern Craven County, North Carolina, just north of the town of Havelock. The mission of MCAS Cherry Point is to maintain and support facilities, services, and material of a Marine Aircraft Wing. OU 6 is located in the southeastern portion of the installation, in the eastern portion of Runway 28 (Figure 1). Runway 28 has not been active since the late 1950s. Since that time, the OU 6 area has been used for crash-crew training (fire fighting), engine run-up activities, and aircraft long-term storage experimentation. OU 6 initially consisted of three sites (Site 12, Site 35, and Point of Environmental Interest [POEI] 35a) (Figure 2). Site 35 was a Marine Aircraft Group (MAG)-14 Accumulation Area closed under Resource Conservation and Recovery Act (RCRA) in 1993 and POEI 35a was a High Power Run-Up Area and Test Cells closed as no further action (NFA) under a CERCLA Decision Document in 2004.

FIGURE 1
OU 6 Location Map



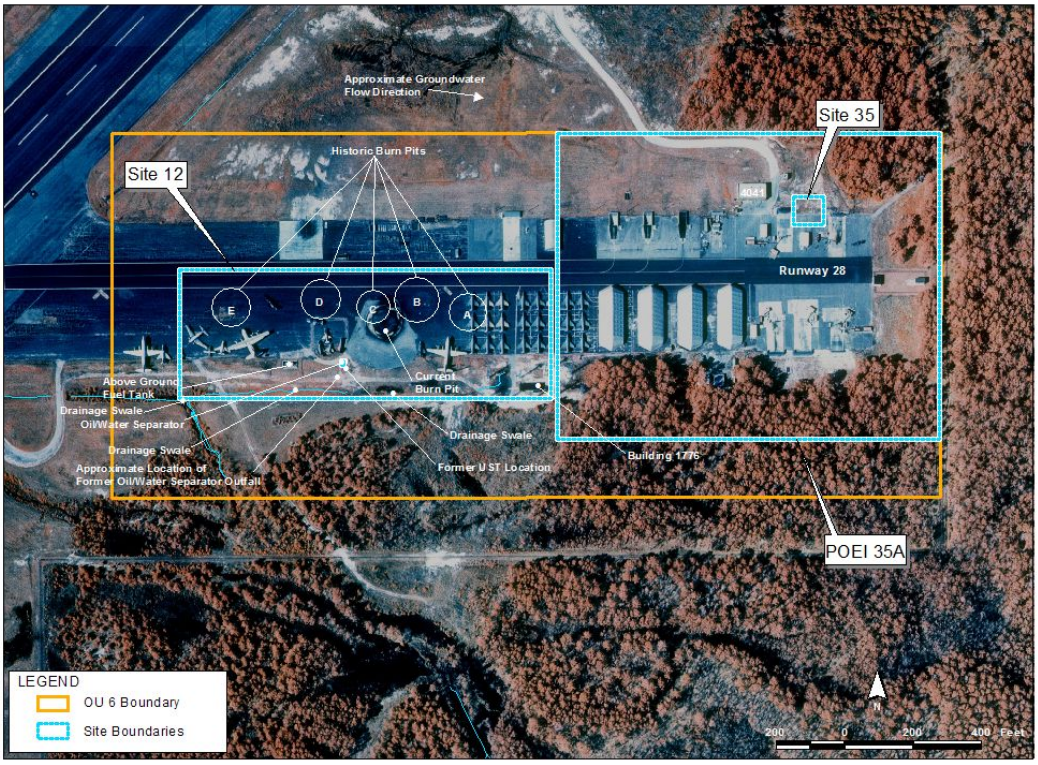
Site 12 is the crash-crew training area that consists of one active and five historical burn pits (Burn Pits A through E) (Figure 2). Waste petroleum, oil, and lubricants and waste burnable solvents were historically burned in pits constructed of dirt placed on top of the asphalt runway surface and shaped into circular berms. The active crash-crew burn pit was constructed in 1985 and consists of a circular concrete pad used to burn waste jet fuel (JP-5). There is a trench drain surrounding the active burn pit that captures runoff from the concrete pad. Other principle site features include an oil/water separator, aboveground fuel storage tank, asphalt surfaces of the runway, and a drainage swale.

2.2 Site Characteristics

Site 12 is characterized by a flat topography with elevations ranging from 20 to 24 feet (ft) above mean sea level. The majority of surface runoff flows southward across the runway onto a mowed grassy area that includes a broad, shallow drainage swale. The swale drains west where it eventually joins a well-defined drainage ditch that flows east through a series of ponds in a swampy area, ultimately discharging to Hancock Creek.

The **hydrogeologic setting** at Site 12 consists of a water table aquifer (Surficial Aquifer) and several deeper aquifers and intervening confining units (Yorktown, Pungo River, and Castle Hayne Aquifers). The Surficial Aquifer is the only aquifer relevant to potential contamination from historical activities at Site 12 due to the depth and thickness of the underlying confining units. The Surficial Aquifer consists of interlayered clay, silt, and sand to depths of 20 to 30 ft below ground surface (bgs). Groundwater beneath Site 12 occurs at approximately 11 ft bgs and flows east towards Hancock Creek (Figure 2). A 22 ft thick clay layer (Yorktown Confining Unit) underlies the Surficial Aquifer and acts as a barrier between the Surficial Aquifer and the underlying aquifers. The low vertical hydraulic conductivity (0.048 ft/day to 0.0014 ft/day) measured in Yorktown Confining Unit at MCAS Cherry Point is indicative of a low permeability material that would impede the downward migration of groundwater.

FIGURE 2
Site 12



2.3 Previous Investigations

The source of potential contamination at Site 12 is from historical crash-crew burn pit training activities at Burn Pits A through E. Assessment of contamination and risk for Site 12 is based on Remedial Investigation (RI) activities conducted in 1999 and Supplemental RI activities conducted in 2003 and 2004. Both the RI and Supplemental RI activities are detailed in the RI. Table 1 summarizes the previous studies and investigations conducted at Site 12.

The nature and extent of contamination was defined by **constituent concentrations**[2] in media exceeding regulatory screening values and MCAS Cherry Point background concentrations. In **soil**, methylene chloride, four pesticides, and eight metals were detected at concentrations exceeding the North Carolina Soil Screening Level (NC SSL) calculations for protection of groundwater used for drinking. In **groundwater**, four pesticides and the metals, iron and manganese were detected at concentrations that exceeded the North Carolina groundwater standards (NC 2Ls). Aroclor-1248 and arsenic exceed their respective MCLs in one groundwater sample. Several metals were detected in both **surface water** and **sediment** and several pesticides and one PCB were detected in surface water at concentrations exceeding regulatory screening values. Upon further review of historical site information and limited soil and groundwater data in the western portion of Site 12, the MCAS Cherry Point Partnering Team agreed to conduct further investigation at Burn Pit E.

TABLE 1: PREVIOUS STUDIES AND INVESTIGATIONS

Previous Study / Investigation*	Date	Investigation Activities
Initial Assessment Study	1983	Site 12 was identified as a crash-crew training area. Due to small residual quantities of contamination and minimal potential for migration, no additional investigation was recommended.
RCRA Facility Investigation	1991	Soil, groundwater, surface water, and sediment sampling was conducted in the OU 6 vicinity. Oil and grease (O&G) and total petroleum hydrocarbons (TPHs) were detected in soil; O&G and metals were detected in groundwater; TPH was detected in surface water; and O&G was detected in sediment. Further investigation was recommended to determine the extent of petroleum contamination.
Technical Direction Memorandum	1993	Soil, groundwater, and sediment sampling was conducted to further delineate the extent of petroleum contamination at OU 6. Benzene and TPH were detected in soil and sediment and metals were detected in groundwater. Additional soil sampling to the depth of the water table for full suite analysis was recommended.
Geoprobe Site Check, Former Underground Storage Tank Location 4182	1996	Soil and groundwater sampling was conducted following removal of an underground storage tank. O&G and TPH were detected in soil and lead was detected in groundwater.
Remedial Investigation Report, OU 6, Site 12	1999 to 2005	16 surface soil (0 to 1 ft bgs), 32 subsurface soil (1 to 11 ft bgs), 7 groundwater (Surficial Aquifer), 3 drainage surface water, and 3 drainage sediment (0 to 0.5 ft bgs) **samples** were collected for analysis of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, pesticides, polychlorinated biphenyls (PCBs), petroleum-related compounds, and/or dioxins/furans. At Burn Pit E, 2 surface soil (0 to 1 ft bgs), 28 subsurface soil (1 to 6 ft bgs), 16 groundwater (Surficial Aquifer) **samples** were collected for analysis of VOCs, SVOCs, and/or PCBs.
Feasibility Study, OU 6, Site 12	2006	Following an evaluation of remedial alternatives, excavation and off-site disposal for soil and MNA with LUCs for groundwater was selected as the Preferred Alternative.
Proposed Plan, OU 6, Site 12	2006	Invites the public to review and comment on the Preferred Alternative for addressing environmental contamination at Site 12 prior to final remedy selection.

*The documents listed are available in the Administrative Record and provide detailed information used to support remedy selection at Site 12.

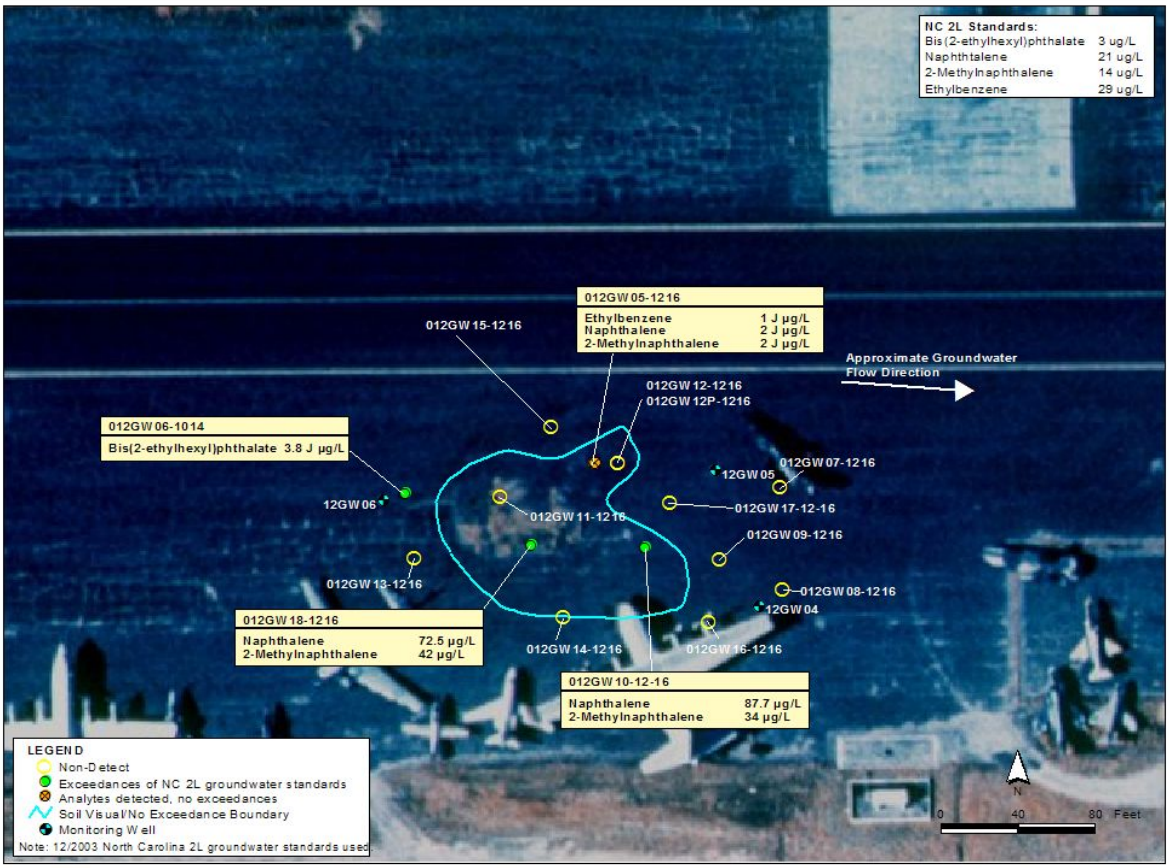
In the vicinity of Burn Pit E, one co-located surface and subsurface soil sample was collected beneath the asphalt runway surface and three groundwater samples were collected. During sampling, a six-inch tar-like layer was identified approximately six ft bgs and was sampled as part of the supplemental investigation. **VOCs and SVOCs were detected** in subsurface soil (including the tar-like layer) and

[2] The drinking water standard (MCL) for **arsenic** was lowered from 50 µg/L to 10 µg/L in 2003.

groundwater. In **subsurface soil**, ethylbenzene, 2-methylnaphthalene, and naphthalene were detected at concentrations exceeding the NC SSLs. In **groundwater**, bis(2-ethylhexyl)phthalate, 2-methylnaphthalene, and naphthalene were detected at concentrations that exceeded the NC 2Ls.

A review of groundwater data collected from 1999 through 2005 from the Surficial Aquifer indicates isolated exceedances of the NC 2Ls with no definable concentration gradient and no spatial distribution. Pesticides and metals were detected infrequently at low concentrations in samples from wells located in the eastern portion of Site 12 (Burn Pits A through D). At Burn Pit E, the NC 2L exceedances of bis(2-ethylhexyl)phthalate, 2-methylnaphthalene, and naphthalene were found in samples collected from three out of 14 locations. Bis(2-ethylhexyl)phthalate was detected in one sample and 2-methylnaphthalene and naphthalene were detected in two samples; these compounds were not detected in downgradient groundwater. These isolated detections indicate that there is no definable plume of groundwater contamination (Figure 3). Based on these low levels of chemicals detected and the nature (high clay content and low permeability) and thickness (22 ft) of the underlying Yorktown Confining Unit, no aquifers below the Surficial Aquifer warranted investigated.

FIGURE 3
Concentrations in Groundwater at Burn Pit E



2.4 Current and Potential Future Site Uses

Site 12 is currently used for the training of crash-crew fire-and-rescue personnel. The runway (Runway 28) is currently inactive. As discussed in Sections 2.2 and 2.3, only the Surficial Aquifer has been impacted by Site 12 activities. The Surficial Aquifer is not currently a resource and is not anticipated to be used as a source of drinking water at MCAS Cherry Point. Under **North Carolina's groundwater classification**, the Surficial Aquifer is considered as Class GA, a potential source of drinking water; therefore, the Navy considered remedial alternatives to restore the aquifer to beneficial use.

The Castle Hayne Aquifer is used as a resource at MCAS Cherry Point for domestic and industrial supply and is classified by the state of North Carolina as an existing or potential source of drinking water. The nearest drinking water well is approximately 1.3 miles upgradient (northwest) of Site 12 and located in the Castle Hayne Aquifer.

MCAS Cherry Point is expected to remain an active military installation into the foreseeable future. Current land use is reasonably anticipated to continue indefinitely to support the mission of the facility. There are no current or future anticipated surface water resources at Site 12 at present. Should future land use differ from the reasonably anticipated land use, the Navy will reassess risks appropriate to future use.

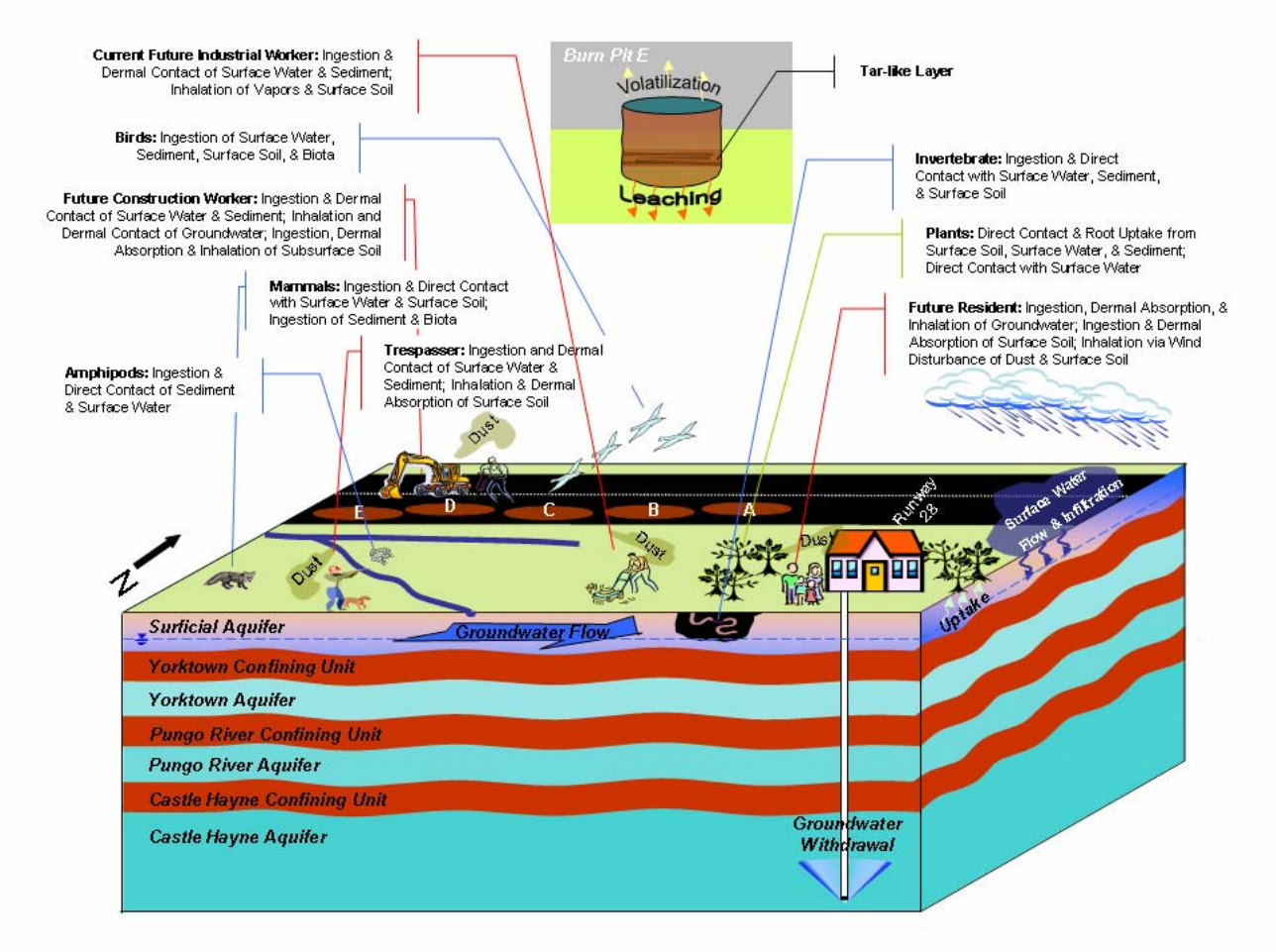
2.5 Summary of Site Risks

The source of potential contamination at Site 12 is from historical crash-crew burn pit training activities, including the identification of a tar-like layer in subsurface soil. The tar-like layer is a source of naphthalene and 2-methylnaphthalene detected in groundwater. The primary fate and transport mechanisms include infiltration of precipitation resulting in leaching of potential contaminants from former Site 12 to soil and groundwater, migration of contaminants in groundwater, and historical surface water runoff from the burn pits to the adjacent drainage swale. A conceptual site model (CSM) for Site 12 is provided as Figure 4. Based on the CSM, Site 12 was evaluated for potential risks to human health and the environment as part of the RI and the results are summarized below.

2.5.1 Human Health Risk Assessment

Based on a **human health CSM**, a **quantitative human health risk assessment** (HHRA) was completed for Site 12 for exposure to surface soil, subsurface soil, groundwater, surface water, and sediment (Figure 4). Potential cancer and non-cancer risks were calculated based on reasonable maximum exposure (RME) and central tendency (CT) exposure point concentrations. The RME assumes the highest level (maximum concentration) of human exposure that could reasonably be expected to occur, whereas the CT reflects a more realistic human exposure to levels (average concentrations) across the site. For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} (a 1 in 10,000 chance of developing cancer) and 10^{-6} (a 1 in 1,000,000 chance of developing cancer) using information on the relationship between dose and response. The 10^{-6} risk level is used as the point of departure for determining performance standards for alternatives when Applicable or Relevant and Appropriate Requirements (ARARs) are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure.

FIGURE 4
Conceptual Site Model



Potential unacceptable risks include cancer risks and non-cancer hazards for a future resident from exposure to surface soil and groundwater. All other pathways evaluated pose **no unacceptable risks** to human health. Although the RME non-cancer hazard is greater than 1 for potential exposure to surface soil by a future child resident, these potential risks were considered acceptable because there are no individual target organs/effects with hazard indices (HIs) greater than 1, the CT exposure is below 1, and the RME cancer risk is within USEPA's acceptable risk range.

In groundwater, potential cancer risks due to aroclor-1248 and arsenic and non-cancer hazards due to arsenic and iron were identified (Table 2).

TABLE 2: SUMMARY OF POTENTIAL HUMAN HEALTH RISKS

Receptor	Media	Pathway	Chemical of Concern	EPC (µg/L)	RME Cancer Risk	RME Non-Cancer Risk (HI)	CT Cancer Risk	CT Non-Cancer Risk (HI)	Cancer Toxicity Factor (CSF) mg/kg-day^{-1}	Non-Cancer Toxicity Factor (RfD) mg/kg-day
Future Child Resident	Groundwater	Ingestion	Arsenic	9.16	7.5×10^{-5}	2.0	Not calculated due to no RME risks	0.39	1.5*	3.0×10^{-4}*
			Iron	$1.54 \times 10^{+4}$	Not carcinogenic	1.6		0.33	Not carcinogenic	6.0×10^{-1}**
		Dermal	Aroclor-1248	5.78×10^{-1}	2.9×10^{-4}	Carcinogenic	1.5×10^{-4}	Carcinogenic	2.2*	NA
Future Adult Resident	Groundwater	Ingestion	Arsenic	9.16	1.3×10^{-4}	0.84	2.3×10^{-5}	0.33	1.5*	3.0×10^{-4}*
Future Lifetime Resident	Groundwater	Dermal	Aroclor-1248	5.78×10^{-1}	2.9×10^{-4}	Not evaluated, risks were calculated for future child and adult residents	1.5×10^{-4}	Not evaluated, risks were calculated for future child and adult residents	2.2*	NA
		Ingestion	Arsenic	9.16	2.0×10^{-4}		7.3×10^{-5}		1.5*	3.0×10^{-4}*

Potential unacceptable risks are shaded yellow
* Source: Integrated Risk Information System (IRIS)
** Source: National Center for Environmental Assessment (NCEA)
CSF – Cancer Slope Factor
RfD – Reference Dose

The potential risks associated with aroclor-1248 and iron in groundwater are considered acceptable based on the following:

- Aroclor-1248 - Infrequent detection (one of five samples) and low concentration (0.89 J µg/L) below the analytical quantitation limit (1 µg/L).
- Iron - The RME non-cancer risks (HI=1.6) exceeds USEPA's acceptable threshold of 1 for the child resident. The CT exposure non-cancer risks are below 1.

Arsenic (30.2 µg/L) exceeds the MCL (10 µg/L) in only one of five samples. The RME non-cancer risks (HI=2) for the child resident and RME cancer risks (10^{-4}) for the adult and lifetime resident exceed USEPA's acceptable risk ranges (HI=1 for non-cancer and 10^{-4} to 10^{-6} for cancer). The CT exposure non-cancer and cancer risks are within USEPA's acceptable risk range.

Based on additional soil data collected from Burn Pit E during the Supplemental RI, **potential human health risks were further evaluated** for the future construction worker. In the absence of USEPA Region 4 risk-based criteria, the **soil data** were screened against the USEPA Region 9 residential preliminary remediation goals (PRGs) because they are conservative risk-based values. There were no surface soil exceedances of USEPA Region 9 PRGs; therefore, there are no unacceptable human health risks from surface soil. Only two constituents (2-methylnaphthalene and naphthalene) detected in subsurface soil exceeded 1/10th of the USEPA Region 9 PRGs; these compounds were carried through the risk assessment process. Because remediation involving potential exposure to 2-methylnaphthalene and naphthalene in site soil was anticipated, a focused risk assessment was performed for the future construction worker.

Potential risks were calculated for 2-methylnaphthalene and naphthalene from incidental ingestion, dermal contact, and inhalation. The **results** demonstrate that there are no unacceptable risks to the future construction worker associated with incidental ingestion (HI=0.0021), dermal contact (HI=0.003), and inhalation (HI=0.000082) of site soil. Potential risks were determined to be unacceptable for the

future resident from exposure to shallow groundwater at Burn Pit E based on NC 2L exceedances of 2-methylnaphthalene and naphthalene which are present as a result of leaching from the overlying tar-like layer in subsurface soil.

The RI specifies the **assumptions and uncertainties** inherent in the risk assessment process due to the number of samples collected or their location, the literature-based values used to calculate risk, and risk characterization across multiple media and exposure pathways.

2.5.2 Ecological Risk Assessment

An ecological risk assessment (ERA) was conducted for Site 12, consisting of Steps 1 through 3A of the Navy ERA process. In Step 1 (problem formulation), the environmental setting, chemical fate and transport, ecotoxicity and potential receptors, and complete exposure pathways were considered in order to develop an **ecological CSM** and **assessment and measurement endpoints**. Potentially complete exposure pathways were identified for both lower trophic-level (e.g., earthworms) and upper trophic-level (e.g., gray fox) terrestrial and aquatic receptor populations based on chemicals in surface soil, surface water, and sediment (Figure 4).

In Step 2, hazard quotients (HQs) were calculated to characterize the potential for chemicals to pose ecological risk using conservative exposure assumptions. HQs represent a ratio of the exposure level to an ecological effect level, and an estimate of potential risk. In Step 2, the exposure level for lower trophic-level receptors was the maximum detected chemical concentration in an exposure medium. For upper trophic-level receptors, the exposure level was the dietary dose estimated through food web modeling, but based on the maximum concentrations. For soil, sediment, and surface water (lower trophic receptors), the effect levels were Region 4 Biological Technical Assistance Group (BTAG) **screening values**. Upper trophic receptor effect levels were the No Observed Adverse Effects Levels (NOAELs) for **reference toxicity values** obtained from the scientific literature. Chemicals with HQs in excess of 1 were identified for each receptor population and selected as **chemicals of potential concern** (COPCs). Because COPCs were identified in Step 2, the ERA proceeded to Step 3A.

In Step 3A, the conservative exposure assumptions employed for Step 2 were **refined** and risk estimates (i.e., HQs) were recalculated using the same CSM and assessment/measurement endpoints. The primary refinement included using average, instead of maximum, chemical concentrations as the basis for exposure and estimating upper trophic-level doses. Following the refined risk calculations, few COPCs still exceeded 1. The potential for those COPCs yielding refined HQs that were greater than 1 to pose unacceptable risk was further characterized using multiple lines-of-evidence. The lines-of-evidence used to characterize remaining Step 3A COPCs included:

- Comparison of inorganic COPC concentrations in soil and sediment to MCAS Cherry Point background;
- Applying **site use factors** (SUF) to define a more realistic exposure scenario for upper trophic level receptors;
- Comparing COPC concentrations to other commonly used screening values from the scientific literature; and
- Consideration of the frequency of detection, frequency of screening value exceedance, magnitude of the HQs relative to 1, and spatial distribution of COPCs.

Based on consideration of these lines of evidence, it was determined that none of the COPCs were expected to pose unacceptable risk to ecological receptor populations at Site 12. Although there was some

uncertainty associated with this conclusion, the scope and conservativeness of the assessment provided additional support that the risk evaluation was protective.

2.5.3 North Carolina Standards

North Carolina requires chemical concentrations in groundwater to meet the promulgated groundwater cleanup standard, **NC 2Ls** (15A NCAC 02L.0202), for protection of groundwater potentially used for drinking. North Carolina has back-calculated soil screening levels (**NC SSLs**) that reflect the constituent concentration in soil that would result in a constituent concentration in groundwater below the NC 2L. The NC SSLs are to-be-considered (TBC) criteria for remedial actions to ensure the protection of groundwater potentially used for drinking. In **groundwater**, three SVOCs (bis(2-ethylhexyl)phthalate, 2-methylnaphthalene, and naphthalene), four pesticides (alpha chlordane, dieldrin, gamma chlordane, and heptachlor epoxide), and two metals (iron and manganese) exceeded the NC 2Ls. In **soil**, two VOCs (ethylbenzene and methylene chloride), two SVOCs (2-methylnaphthalene and naphthalene), four pesticides (alpha chlordane, dieldrin, gamma chlordane, and heptachlor epoxide), and eight metals (antimony, cadmium, chromium, iron, lead, manganese, mercury, and silver) exceeded the NC SSLs. Only 2-methylnaphthalene and naphthalene in groundwater and ethylbenzene, 2-methylnaphthalene, and naphthalene in soil at Burn Pit E are considered reflective of a site-related release based on the following rationale:

- Methylene chloride and bis(2-ethylhexyl)phthalate are common laboratory blank contaminants that were detected in soil and groundwater, respectively, infrequently at low, estimated concentrations.
- Pesticide concentrations in soil and groundwater are low and qualified as estimated below the quantitation limits.
- Chromium, iron, mercury, and silver concentrations in soil and manganese concentrations in groundwater are similar to MCAS Cherry Point background based on population-to-population statistical analysis of Site 12 and background data.
- Antimony, lead, and manganese were only detected in soil above the NC SSLs at isolated locations south of the burn pits.
- Although site concentrations of antimony, chromium, iron, manganese, and mercury detected in soil exceeded the MCAS Cherry Point background, these concentrations were determined not to be site-related based on site use as fire training pits. Burnable solvents (petroleum, oil, and lubricants) were typically used for training. Additionally, these site concentrations are within the average range of concentrations detected in **eastern United States soil**.
- The average lead concentration in site soil (83 mg/kg) is well below the USEPA Integrated Exposure Uptake Biokinetic (IEUBK) Model risk screening level of 400 mg/kg.
- Although cadmium was detected at levels consistently above the NC SSLs and MCAS Cherry Point background across the site (i.e., no source area or "hot spot") there was no risk to human health identified and there were no detections in groundwater.
- Iron and manganese are essential nutrients frequently detected in Surficial Aquifer groundwater, which is not currently used as a potable source because it has a lower yield and poorer water quality than the available deeper Castle Hayne Aquifer.

2.5.4 Basis for Response Action

Under North Carolina's groundwater classification, the Surficial Aquifer is considered Class GA, a potential source of drinking water; consequently, NCDENR identified the NC 2Ls as an applicable requirement for groundwater remediation. Although exposure to surface soil does not indicate immediate site-related risks, the circumstances of this particular site and CERCLA's expectation of returning groundwater sources to beneficial use support implementation of a remedy for groundwater as being within the discretion of the lead agency. The Navy and Marine Corps, in partnership with USEPA and NCDENR considered all pertinent factors in accordance with the remedy selection criteria and determined remedial action is desirable to remove the tar-like layer in **subsurface soil** that is a source of naphthalene and 2-methylnaphthalene to groundwater, necessary for the timely remediation of **groundwater** to the NC 2Ls because:

- The State has classified groundwater as a potential drinking water source,
- There are no current controls to prevent groundwater use as a drinking water source,
- The tar-like layer is a continuing source that needs to be removed in order to prevent further contamination of the groundwater,
- Eliminating the tar-like layer reduces the timeframe associated with long-term monitoring of groundwater and LUCs,
- One of the program goals of CERCLA is to minimize untreated waste,
- One of the expectations of CERCLA is to return groundwater to their beneficial use, and
- The cost of an action is comparable with the cost of long-term monitoring of groundwater and LUCs.

The TBC criteria (NC SSLs) have been determined to be pertinent to the remedy for soil because these criteria reflect the constituent concentration in soil that would result in a constituent concentration in groundwater below the NC 2L. The MCL is a relevant and appropriate ARAR for arsenic. The concentrations of COCs requiring a response action are summarized in Table 3 and the extent of contamination is shown on Figure 5.

TABLE 3: CHEMICALS OF CONCERN REQUIRING A RESPONSE ACTION

	Subsurface Soil			Groundwater		
Chemical of Concern	Maximum Detected (µg/kg)	NC SSL (µg/kg)	NC SSL Frequency of Exceedance	Maximum Detected (µg/L)	NC 2L (µg/L)	NC 2L Frequency of Exceedance
Ethylbenzene	560 J	241	1 / 1	NE	NE	NE
Naphthalene	10,800	585	14 / 27	87.7	21	2 / 14
2-Methylnaphthalene	17,100	1,720	12 / 27	42.0	14	2 / 14
Arsenic	NE	26.2	0 / 16	30.2	10*	1 / 5

J - Reported value is estimated
NE – No Exceedance
* MCL

FIGURE 5
Extent of Soil Removal Area and LUC Boundary

2.6 Principal Threat Waste

Principal threat wastes are hazardous or highly toxic source materials that result in ongoing contamination to surrounding media, generally cannot be reliably contained, or present a significant risk to human health or the environment should exposure occur. Because the tar-like layer in subsurface soil does not pose unacceptable risks to the construction worker the tar-like layer and COCs detected are not considered hazardous or highly toxic. Although the tar-like layer is considered a source of COCs to shallow groundwater, the concentrations detected in groundwater are low (just above the NC 2Ls, requiring remediation for protection of drinking water) indicating limited mobility. Therefore, there are no principal threat wastes at Site 12.

2.7 Remedial Action Objectives

Remedial action objectives (RAOs) are established based on attainment of regulatory requirements, standards, and guidance; contaminated media; COCs; potential receptors and exposure scenarios; and human health and ecological risks. The RAOs for Site 12 are to:

- Prevent human exposure to groundwater and reduce concentrations of COCs to the NC 2L standards and MCLs.

- Remove the tar-like layer in subsurface soil as a continuing source of COCs to groundwater.

Specific performance standards to meet the RAOs are listed in Table 4.

TABLE 4: PERFORMANCE STANDARDS

Chemical of Concern	Soil Performance Standard (NC SSL)	Groundwater Performance Standard (NC 2L)
Ethylbenzene	241 µg/kg	No Exceedance
Naphthalene	585 µg/kg	21 µg/L
2-Methylnaphthalene	1,720 µg/kg	14 µg/L
Arsenic	Not Applicable	10 µg/L (MCL)

2.8 Description and Evaluation of Remedial Alternatives

To address the tar-like layer in subsurface soil and NC 2L exceedances in groundwater, preliminary screening of **General Response Actions (GRAs) and remedial approaches** was completed to refine the remedy selection process, as detailed in the Feasibility Study (FS). Six soil and five groundwater remedial approaches were retained as **preliminary remedial alternatives** and were evaluated with respect to implementability, effectiveness, and relative cost (high/moderate/low). Detailed cost analysis were not performed as part of this preliminary screening. The preliminary remedial alternatives excluded from further analysis were:

- LUCs as a sole remedy for soil and groundwater because LUCs do not reduce concentrations of COCs in a potential drinking water aquifer where NC 2Ls are an applicable requirement.
- Soil fracturing and soil vapor extraction (SVE) because the COCs do not readily volatilize and ex-situ treatment systems interfere with airfield operations.
- Thermal treatment for soil because of the low volume and concentrations of COCs present.
- Groundwater pump and treat with air stripping and discharge to Hancock Creek because the conservative estimated present worth costs ($850,000) are moderately high for the low volume and concentrations of COCs present. Additionally, pump and treat is not an effective remedy given the absence of a defined contaminant plume.

Although MNA for groundwater was evaluated further in the FS, it is not considered a stand-alone remedial alternative because it does not prevent human exposure to COCs in groundwater. Because of the relatively low concentrations of COCs and cost, MNA is an effective remedy component in conjunction with other alternatives. Consistent with the NCP, a no action alternative was evaluated as a baseline for the comparative analysis. Three remedial alternatives for soil (no action, biostimulation and off-site disposal, and excavation and off-site disposal) and two remedial alternatives for groundwater (no action, and MNA and LUCs) were retained for a detailed comparative analysis in accordance with the NCP.

2.8.1 Description of Remedial Alternatives

Table 5 provides the major components, details, and cost of each remedial alternative identified for soil and groundwater.

TABLE 5 - REMEDIAL ALTERNATIVES

Alternative	Components	Details	Cost
Soil			
No Action *No action for contaminated soil with no restriction on activities.*	-Existing soil	-No action	No cost
Biostimulation and Off-Site Disposal *Excavation and stockpiling of contaminated soil for on-site ex-situ treatment followed by backfilling and site restoration.*	-Excavation of soil -On-site ex-situ biostimulation followed by off-site disposal -Site restoration -Site controls	-Excavation of an estimated 1,333 yd^3 of soil. On-site material will be evaluated for potential re-use for backfill (it is estimated that only 1/3 of excavated material is contaminated based on existing sample data) -Collection of confirmation samples from the excavation and of the uncontaminated soil for analysis of COCs to verify performance standards are met -Stockpiling of contaminated site soil and placement on a treatment pad with physical controls (fencing and signs) to prevent access and erosion and sediment controls (silt fencing) to prevent contaminant transport -Mixing stockpiled soil with amendments (i.e., commercial fertilizer) and bi-weekly aeration to stimulate biological degradation -Periodic sampling of stockpiled soil until performance standards are met followed by off-site disposal -Mixing clean fill and uncontaminated site soil for backfill and site restoration (repaving)	Capital Cost: $291,600 Annual O&M Cost: $0 **Present-Worth Cost: $291,600** Discount Rate: 3.5% Timeframe: 2 years
Excavation and Off-Site Disposal *Excavation of contaminated soil followed by off-site disposal, backfilling, and site restoration.*	-Excavation of soil -Off-site disposal -Site restoration -Site controls	-Excavation of an estimated 1,333 yd^3 of soil. On-site material will be evaluated for potential re-use for backfill (it is estimated that only 1/3 of excavated material is contaminated based on existing sample data) -Collection of confirmation samples from the excavation and of the uncontaminated soil for analysis of COCs to verify performance standards are met -Stockpiling of contaminated site soil with physical controls (signs) to prevent access and erosion and sediment controls (silt fencing) to prevent contaminant transport during waste characterization -Waste characterization testing to classify the contaminated soil for proper off-site disposal -Mixing clean fill and uncontaminated site soil for backfill and site restoration (repaving)	Capital Cost: $229,300 Annual O&M Cost: $0 **Present-Worth Cost: $229,300** Discount Rate: 3.5% Timeframe: 1 month
Groundwater			
No Action *No action for contaminated groundwater with no restriction on activities.*	-Existing groundwater	-No action	No cost
MNA and LUCs *Groundwater monitoring to access concentrations of COCs until performance standards have been achieved via natural attenuation*	-MNA groundwater monitoring -LUCs	-Periodic groundwater monitoring (three existing wells and one newly installed well) for natural attenuation indicator parameters and reporting -LUCs to restrict access to the Surficial Aquifer so that the potential exposure pathway to contamination would remain incomplete until performance standards have been achieved -O&M of monitoring wells	Capital Cost: $73,400 Annual O&M Cost: $24,900 **Present-Worth Cost: $194,300** Discount Rate: 3.5% Timeframe: 5 years

2.8.2 Comparative Analysis of Alternatives

A comparative analysis of alternatives with respect to the **nine evaluation criteria** was completed and is provided below. Table 6 depicts a relative ranking of the alternatives. The distinguishing feature between the soil alternatives is on-site ex-situ treatment (biostimulation alternative) of contaminated soil prior to off-site disposal of clean material as compared to removal (excavation alternative) and off-site disposal of contaminated material.

TABLE 6 – RELATIVE RANKING OF REMEDIAL ALTERNATIVES

CERCLA Criteria	Soil Alternatives			Groundwater Alternatives	
	No Action	Bio-stimulation and Off-Site Disposal	Excavation and Off-Site Disposal	No Action	MNA and LUCs
Threshold Criteria					
Overall Protection of Human Health and the Environment	□	■	■	□	■
Compliance with ARARs	□	■	■	□	■
Balancing Criteria					
Long-Term Effectiveness and Permanence	□	■	■	□	❒
Reduction in Toxicity, Mobility or Volume through Treatment	NA	■	NA	NA	NA*
Short-Term Effectiveness	□	❒	■	□	❒
Implementability	■	□	❒	■	❒
Present-Worth Cost	$0	$291,600	$229,300	$0	$194,300
Modifying Criteria					
State Acceptance	□	❒	■	□	■
Community Acceptance	NC	NC	NC	NC	NC

Ranking: □Low ❒ Moderate ■High

* - While MNA is not considered a treatment, the natural reduction of contaminant concentrations through a variety of physical, chemical, or biological activities is expected within a reasonable timeframe.
NA: Not applicable
NC: No significant public comments were received on the Proposed Plan; questions raised at the public meeting were general inquiries for informational purposes only.

Threshold Criteria

Overall Protection of Human Health and the Environment. The no action alternatives for soil and groundwater do not achieve RAOs and; therefore, do not protect human health and the environment and are not considered further in this ROD. Both the biostimulation and off-site disposal and the excavation and off-site disposal alternatives for soil would provide adequate protection of human health by eliminating exposure to contaminated soil through removal. For groundwater, the MNA and LUCs alternative would provide adequate protection of human health and the environment by controlling exposure to groundwater through LUCs while concentrations of COCs naturally attenuate.

Compliance with ARARs. The ARARs include any Federal or State standards, requirement, criteria, or limitations that are determined to be legally applicable or relevant and appropriate to a CERCLA site or action. TBC criteria are non-promulgated advisories or guidance issued by Federal or State government

and do not have the status of potential ARARs but are evaluated along with ARARs. The soil and groundwater alternatives for OU 6 would comply with the **ARARs and TBC criteria**.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence. The biostimulation alternative and excavation alternative for soil would remove contaminated soil resulting in UU/UE; thereby providing long-term effectiveness and permanence. Once performance standards have been met, through MNA and LUCs for groundwater, long-term effectiveness and permanence is achieved.

Reduction in Toxicity, Mobility, or Volume through Treatment. While all the alternatives are expected to reduce toxicity, mobility, or volume, the only alternatives with treatment components are biostimulation and off-site disposal for soil. While MNA is not considered a treatment, the natural reduction of contaminant concentrations through a variety of physical, chemical, or biological activities is expected with a reasonable timeframe.

Short-Term Effectiveness. The excavation and off-site disposal alternative provides the greatest short-term effectiveness due to the shorter timeframe (1 month) until protection is achieved, in comparison to biostimulation and off-site disposal (2 years). The excavation component of both soil alternatives have equal short-term effectiveness; however, the stockpiling and ex-situ treatment component of the biostimulation alternative results in increased duration exposure of contaminated media to workers and the environment during implementation. The excavation and off-site disposal alternative would result in a potential risk to surrounding communities during the transport of contaminated soil off-site. The MNA and LUCs alternative for groundwater poses minimal risk to workers conducting monitoring, as the risks are addressed through use of personal protective equipment, and the time to achieve protectiveness is five years.

Implementability. The excavation component of both soil alternatives is easily implemented using well-established technologies with conventional equipment and standard construction methods. The biostimulation alternative for soil is more difficult to implement because the on-site ex-situ treatment component adversely impacts MCAS Cherry Point operations by requiring bi-weekly manipulation in the airfield vicinity. Additionally, the soil pile and the mixing of soil amendments would likely attract birds requiring measures to minimize Bird Aircraft Strike Hazards (BASH). The MNA and LUCs alternative for groundwater can easily be implemented using standard procedures.

Cost. The estimated present-worth cost for excavation and off-site disposal ($229,300) is less than biostimulation and off-site disposal ($291,600). The estimated present-worth cost for the MNA and LUCs is $194,300.

Modifying Criteria

State Acceptance. State involvement has been solicited throughout the CERCLA process. The NCDENR as the designated state support agency in North Carolina concurs with the Selected Remedy.

Community Acceptance. The public expressed its support for the preferred alternative presented in the public meeting. The questions and concerns raised at the meeting were general inquiries for informational purposes only; no significant comments were received from the public.

2.9 Selected Remedy

2.9.1 Rationale for Selected Remedy

The Selected Remedy for Site 12 is excavation and off-site disposal for soil and MNA and LUCs for groundwater because it provides the best balance of tradeoffs with respect to the nine criteria. This

remedy meets the RAOs by excavating contaminated soil exceeding the NC SSLs, thereby removing the potential source of contaminants to groundwater, and prohibiting access to groundwater through LUCs until the NC 2Ls are met through MNA. Additionally, because arsenic exceeds the MCL in the Surficial Aquifer (identified as a drinking water source), the MCL is a relevant and appropriate ARAR of the Safe Drinking Water Act and will be addressed through MNA. LUCs will prevent potable use of groundwater in the Surficial Aquifer until MCLs are achieved.

Natural attenuation, through biological degradation, volatilization, diffusion, dispersion, and absorption, is an effective remedy for groundwater treatment. Site-specific **MNA** parameters were evaluated to determine if conditions are favorable for the intrinsic biodegradation of the organic contaminants. The MNA parameter data and analytical results suggest that biodegradation of the COCs has occurred; low nitrate concentrations, moderately low oxygen reduction potential, elevated iron (II) concentrations, low sulfate concentrations, elevated methane concentrations, and groundwater temperatures are favorable for biodegradation. The site-specific data suggests that conditions are currently anoxic/anaerobic at the site. The removal of the tar-like layer will allow the oxygen levels to increase, thereby increasing the rate biodegradation of the COCs.

The principal factors in this remedy selection decision are achieving the performance standards in the shortest timeframe and in a cost-effective manner with minimal impacts to MCAS Cherry Point operations. The Selected Remedy for soil, in comparison with the biostimulation and off-site disposal alternative, achieves performance standards for soil in 1 month as compared to 2 years, costs $229,300 as compared to $291,600, and does not result in stockpiled material remaining on-site hindering MCAS Cherry Point operations.

2.9.2 Description of Selected Remedy

The Selected Remedy for soil consists of excavation of the tar-like layer (approximately 444 yd^3) and surrounding soil (approximately 888 yd^3) within Burn Pit E. The total limits of excavation are estimated to encompass 6,000 ft^2 to a depth of 6 ft bgs (1,333 yd^3) based on existing site information (Figure 5). The final limits of excavation will be determined by confirmation samples verifying that performance standards (NC SSLs) have been met. The performance standards are shown in Table 4. Site restoration will include backfilling the excavation with clean fill and reuse of site soil with concentrations of COCs below the performance standards, and repaving. Waste characterization testing will be conducted to classify the soil for proper off-site disposal.

To address groundwater containing COCs at concentrations exceeding NC 2Ls and MCLs, the Selected Remedy consists of MNA and LUCs. MNA consists of periodic groundwater monitoring for COCs and natural attenuation indicator parameters to demonstrate if source removal results in reduction in concentrations over time. Monitoring will consist of quarterly sampling of groundwater from wells located within the source area and documented in an annual technical memorandum. Upon completion of the first year of monitoring, the frequency will be evaluated by the MCAS Cherry Point Partnering Team and adjusted accordingly to meet the site conditions. The groundwater monitoring system will consist of four monitoring wells (three existing wells and one newly installed well). MNA is expected to result in a reduction of contaminant concentrations to MCLs within five years.

The objectives of the LUCs shall be to:

- Restrict access to groundwater so the potential exposure pathway to the contaminants would remain incomplete.
- Prohibit the withdrawal and/or future use of water, except for monitoring, from the Surficial Aquifer within the identified groundwater LUC boundary (Figure 5).

- Prohibit intrusive activities that encounter the water table within the extent of current groundwater contamination unless specifically concurred with by both NCDENR and USEPA.
- Maintain the integrity of any current or future monitoring system.

Specific types of LUCs include: 1) incorporate land use prohibitions into the MCAS Cherry Point master planning process; 2) a deed Notice of Inactive Hazardous Substance or Waste Disposal filed in Craven County real property records per NCGS 130A-310.8; and 3) deed restrictions included in any deed transferring any portion of OU 6, Site 12 to any non-Federal transferee. The site shall be inspected periodically, and the Navy will certify the effectiveness of the LUCs. The Navy will maintain LUCs within the boundaries of Burn Pit E (Figure 5) until the concentrations of hazardous substances in the groundwater are at such levels as to allow for UU/UE.

Within 120 days of the ROD signature, the Navy shall prepare and submit to USEPA and NCDENR for review and concurrence, in accordance with the FFA and the schedule in the Site Management Plan, a Remedial Design (RD) to implement the Selected Remedy. The LUC portion of the RD will provide for implementation and maintenance actions, including periodic inspections and reporting. The Navy will implement, maintain, monitor, report on and enforce the LUCs in accordance with the RD. Although the Navy may later transfer these responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for remedy integrity.

2.9.3 Expected Outcomes of the Selected Remedy

Although current land uses are expected to continue at Site 12 and there is no other planned land uses in the foreseeable future, UU/UE will be available at the site as a result of the Selected Remedy. The expected outcome of MNA of groundwater will be UU/UE once the performance standards are met. Until then, exposure will be controlled through LUCs. The effectiveness of MNA in groundwater will be measured through implementation of a groundwater-monitoring program. The groundwater monitoring program will continue until each COC at each sample location is at or below its respective performance standard (Table 4) for four consecutive sampling events to demonstrate no seasonal variations in concentrations. When all COCs have achieved their goals for four consecutive sampling events, procedures for site closure will be initiated. Once RAOs for this groundwater action have been achieved, OU 6, Site 12 is expected to be suitable for UU/UE. Therefore, the Navy, USEPA, and NCDENR may agree for the LUC component of the Selected Remedy to be terminated at site closeout. If the Navy and the USEPA, with NCDENR's concurrence, determines that MNA and LUCs are insufficient to meet RAOs in a timeframe compatible with MCAS Cherry Point operations, other more aggressive remedial approaches (e.g., in-situ treatment) will be evaluated and documented if implemented.

2.9.4 Statutory Determinations

In accordance with the NCP, the Selected Remedy meets the following statutory determinations.

- **Protection of Human Health and the Environment -** The Selected Remedy is needed to restore groundwater to levels consistent with drinking water use and will protect human health and the environment through excavation of contaminated soil and implementation of LUCs to prevent the potable use of groundwater until concentrations are reduced to acceptable levels.
- **Compliance with ARARs -** The Selected Remedy will attain the federal and state ARARs and TBC presented herein. There are no ARARs that the remedy will not meet.

- **Cost-Effectiveness -** The Selected Remedy is the most cost-effective alternative and represents the most reasonable value for the money. The costs are proportional to overall effectiveness by achieving long-term effectiveness and permanence within a reasonable timeframe.
- **Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable -** The Selected Remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be used in a practicable manner at Site 12. For soil, although a treatment alternative was evaluated, excavation and off-site disposal provides the best balance of tradeoffs given the relatively small volume of contaminated soil to achieve long-term effectiveness and permanence, ease of implementation using standard construction practices, and reasonable cost. For groundwater, an MNA remedy was chosen because the volume and concentration of COCs are low and following source removal, MNA is expected to be successful in attaining performance standards in groundwater. MNA has been successful in meeting performance standards at other similar MCAS Cherry Point sites.
- **Preference for Treatment as a Principal Element –** Although the Selected Remedy for groundwater does not provide for treatment as a principle element, reduction of groundwater contamination is expected over time due to natural processes. The Selected Remedy for groundwater represents the maximum extent to which permanent solutions and treatment are practicable at OU 6 because based on the low volume and concentrations of COCs present, treatment would not be cost effective. Treatment is not a principal element for soil because excavation and off-site disposal provides the best balance of tradeoffs with respect to long-term effectiveness and permanence in the shortest timeframe for a reasonable cost.
- **Five-Year Review Requirements -** Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site in groundwater above levels that allow for UU/UE, a statutory review will be conducted no less often than each 5 years after the initiation of remedial action to ensure that the remedy is protective of human health and the environment. Performance standards will be achieved in soil upon completion of the source removal, and are expected to be achieved in groundwater within five years.

2.10 Community Participation

Community participation at MCAS Cherry Point includes a Restoration Advisory Board (RAB), public meetings, public information repositories, newsletters and fact sheets, public notices, and an IR Program web site. The Community Involvement Plan for MCAS Cherry Point provides detailed information on community participation for the Installation Restoration (IR) Program.

The RAB was formed in 1995 and consists of community members and representatives of the USEPA, NCDENR, Navy, and Marine Corps. RAB meetings are held about every 3 months and are open to the public to provide opportunity for public comment and input. The investigations conducted at OU 6, the findings, and potential remedial approaches have been presented and discussed at the RAB meetings. The public information repository is located at the Havelock-Craven County Library, 301 Cunningham Blvd, Havelock, NC 28532, Phone 252-447-7509. Documents and relevant information relied upon in the remedy section process will be made available for public review in the public information repository or the **IR Program website**.

For access to the Administrative Record or additional information on the IR Program, contact:

Public Affairs Office
NAVFAC Atlantic
6506 Hampton Blvd.
Norfolk, VA 23508-1278
757-322-8005

In accordance with Sections 113 and 117 of CERCLA, the Navy and MCAS Cherry Point provided a public comment period from May 1 through June 15, 2006, for the proposed remedial action described in the Proposed Plan for Site 12. A public meeting to present the Proposed Plan was held at the Havelock Tourist and Event Center, located in Havelock, North Carolina, on May 9, 2006. Public notice of the meeting and availability of documents was placed in the *Sun Journal Newspaper* on April 16, the *Havelock News* on April 19, 2006; the *Windsock* on April 20, 2006; and the *Carteret County News-Times* on April 21, 2006.

3 Responsiveness Summary

The participants in the public meeting, held on May 9, 2006, included RAB members and representatives of the Navy, USEPA, and NCDENR. With the exception of the Modifying Criteria, rankings are provided as qualitative descriptions of the relative compliance of each alternative with the criteria. Questions and concerns received during the meeting were addressed at the meeting and are documented in the **meeting transcript**[3]. No additional written comments, concerns, or questions were received by the Navy, USEPA, or NCDENR during the public comment period.

[3]**The meeting transcript includes a misquote on page 19, line 28 where the Selected Remedy for soil was accidentally referred to as MNA and institutional controls rather than excavation and off-site disposal.**

Federal Chemical-Specific ARARs and TBCs
Operable Unit 6, Site 12
MCAS Cherry Point, North Carolina

Media	Requirement	Prerequisite	Citation	ARAR Determination	Comment
Safe Drinking Water Act					
Groundwater	SDWA standards serve to protect public water systems. Primary drinking water standards consist of federally enforceable MCLs at the tap. MCLs are the highest level of a contaminant that is allowed in drinking water.	Impact to public water systems that have at least 15 service connections or serve at least 25 year-round residents. May also be cleanup standards for on-site ground or surface waters that are current or potential sources of drinking water.	40 CFR 141.11 to 141.16 and 141.61 to 141.66	Relevant and Appropriate	Groundwater remediation goals are based on the more stringent NC 2L Standards for some COCs.
Groundwater	SDWA standards serve to protect public water systems. The MCLG is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.	Impact to public water systems that have at least 15 service connections or serve at least 25 year-round residents. May also be cleanup standards for on-site ground or surface waters that are current or potential sources of drinking water.	40 CFR 141.50 to 141.55	Relevant and Appropriate	Groundwater remediation goals are based on the more stringent NC 2L Standards for some COCs.
Groundwater	National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water.	Impact to public water systems that have at least 15 service connections or serve at least 25 year-round residents. May also be cleanup standards for on-site ground or surface waters that are current or potential sources of drinking water.	40 CFR 143	To Be Considered	Groundwater remediation goals are based on the more stringent NC 2L Standards for some COCs.
USEPA Region 9 PRGs					
Groundwater	Chemical-specific PRGs.	Public water system.	USEPA Region 9 PRGs	To Be Considered	Although PRGs may be considered, groundwater remediation goals are based on NC 2L Standards and MCLs.
Soil	Chemical-specific PRGs.	CERCLA site.	USEPA Region 9 PRGs	To Be Considered	Although PRGs may be considered, soil remediation goals are based on NC SSLs.

North Carolina Action-Specific ARARs and TBCs
Operable Unit 6, Site 12
MCAS Cherry Point, North Carolina

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comment
Groundwater Classification and Standards [Title15A subchapter 2L]					
Corrective Action	Restoration of groundwater quality to the level of the standards, or as closely thereto as is economically and technologically feasible.	Areas where groundwater quality has been degraded. Activities resulting in the discharge of waste or hazardous substance and/or discovery of an unauthorized release to the surface or subsurface.	*15A NCAC 2L .0106*	Applicable	The OU 6 remedy will include corrective action (MNA) to achieve 2L standards.
Well Construction Standards [Title15A subchapter 2C]					
Monitoring well installation, repair, and abandonment	Construction, operation, repair, or abandonment of wells not used for water supply must not adversely impact the quality of groundwater.	Wells not used for water supply.	*15A NCAC 2C .0108, .0112, .0113, and .0114*	Applicable	The OU 6 MNA monitoring system will comply with this requirement.
Pumps and pumping equipment	The pump specifications and installation shall meet the specified requirements.	Wells constructed with a pumping mechanism.	*15A NCAC 2C .0109*	Relevant and Appropriate	The MNA monitoring network is not anticipated to include permanently installed pumping mechanisms.
Erosion and Sediment Control [Title15A subchapter 4B]					
Land disturbing activities	Activities that disturb land greater than one acre shall implement an erosion and sediment control plan and shall include the use of ground cover sufficient to restrain erosion. Control measures shall meet design and performance standards, provide stormwater outlet protection, and shall be inspected and adequately maintained. Disturbances to less than one acre of land must implement an erosion and sediment control plan, use best management practices, and provide ground cover for denuded areas. Storm drains and watercourses must be protected from sediment and debris contamination.	Existing uncovered areas greater than one acre and any new disturbances to land regardless of size. Land disturbing activities include the construction of access and haul roads, borrow and waste areas, and activities conducted in lakes or natural watercourses.	*15A NCAC 4B .0107-.0113, .0116, .0118, and .0129*	Applicable	The OU 6 remedy includes soil excavation. Best management practices and sediment and erosion control measures will be implemented. Following excavation, the ground surface will be restored.
Land disturbing activities in or proximal to a watercourse	Minimum buffer zone areas must be maintained and construction and design requirements must be achieved. No land disturbing activity shall be undertaken within a buffer zone adjacent to designated trout waters that will cause adverse temperature fluctuations.	Land disturbing activities in sensitive watersheds or buffer zones.	*15A NCAC 4B .0124, and .0125*	Relevant and Appropriate	The remedy at OU 6 is not expected to encroach into sensitive watersheds or buffer zones. In the event the remedy does encroach the buffer zone the activities will comply with the requirements.
Hazardous Waste Management [Title15A subchapter 13A]					
Storage, and/or disposal of hazardous waste	Characterization of waste. Activities associated with waste identified as hazardous waste must comply with requirements for manifesting, record keeping, reporting, shipping, and/or transporting of waste.	Identification, generation, shipment, and/or transport of hazardous waste.	*15A NCAC 13A .0106 and .0107*	Relevant and Appropriate	Excavation at OU 6 will generate materials which will be characterized for off site disposal in an approved facility. The soil does not contain a listed hazardous waste and is not expected to be a characteristic hazardous waste based on existing site data.

North Carolina Action-Specific ARARs and TBCs
Operable Unit 6, Site 12
MCAS Cherry Point, North Carolina

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comment
Solid Waste Management Regulations [Title15A subchapter 13B]					
Storage, and/or disposal of solid waste	Solid waste shall be stored, collected, transported, separated, processed, recycled, recovered, and disposed of in a manner consistent with the requirements. No radioactive waste material shall be collected and transported, stored, treated, processed, disposed of or reclaimed, except as specifically authorized.	Storage, shipment, and/or transport of solid waste.	*15A NCAC 13B .0104, .0105, .0106*	Applicable	The excavation will generate material which will be characterized for off site disposal in an approved facility.
Air Pollution Control Requirements [Title15A subchapter 2D]					
Particulates from fugitive non-process dust emission sources	No facility or source of air pollution shall cause any ambient air quality standard to be exceeded or contribute to a violation of any ambient air quality standard except as allowed.	Generation of fugitive non-process particulate mater that is not collected by a capture system.	*15A NCAC 2D .0400* *15A NCAC 2D .0500*	Applicable	No discharges to air are anticipated other than fugitive dust.

North Carolina Chemical-Specific ARARs and TBCs
Operable Unit 6, Site 12
MCAS Cherry Point, North Carolina

Media	Requirement	Prerequisite	Citation	ARAR Determination	Comment
Air Quality Rules **[Title15A subchapter 2D and 2Q]**					
Air	No facility or source of air pollution shall cause any ambient air quality standard to be exceeded or contribute to a violation of any ambient air quality standard except as allowed.	Air emission from agricultural, municipal and industrial processes, or other pollutant management activities.	15A NCAC 02D .0400 15A NCAC 02Q .0300	Applicable	The only potential air emission is from fugitive dust during excavation. Fugitive dust will be controlled during excavation
Groundwater Classification and Standards **[Title15A subchapter 2L]**					
Groundwater	Classifies groundwater by usage and occurrence. Specifies groundwater quality standards and threshold limits.	All groundwater potable or non potable.	15A NCAC 02L.0202	Applicable	NC 2L groundwater standards are applicable remediation goals for the OU 6 groundwater remedy.
Hazardous Waste Management **[Title15A subchapter 13A]**					
Soil, groundwater, surface water, sediment	Identification and listing of hazardous waste. Wastes to be managed must be sampled to determine the appropriate waste characterization.	Management of hazardous waste.	15A NCAC 13A .0106 15A NCAC 13A .0107 15A NCAC 13A .0119	Relevant and Appropriate	All material excavated will be characterized for proper off-site disposal. The soil does not contain a listed hazardous waste and is not expected to be a characteristic hazardous waste based on existing site data.
Solid Waste Management Rules **[Title15A subchapter 13B]**					
Solid Waste (soil, sediment, sludge)	All solid waste shall be stored, collected, transported, separated, processed, recycled, recovered, and disposed of in a manner consistent with this requirement.	Management of solid waste.	15A NCAC 13B .0100	Applicable	The excavation will generate material which will be characterized for off site disposal in an approved facility.
Soil Screening Levels **[NC Hazardous Waste Section]**					
Soil	Establishing unrestricted use levels that are protective of both human health and the environment. Two potential soil pathways are 1) direct contact to soil by residents, and 2) the leaching of a chemical from soil to groundwater. For unrestricted use, at a minimum, both of these standards must be met. If other exposure pathways exist or the exposure conditions at a site are greater in magnitude than the default values used to calculate the screening levels provided, additional steps are required.	Concentrations of chemicals in soil.	NC Guidelines for Establishing Remediation Goals at RCRA Hazardous Waste Sites. Soil screening levels are based on USEPA Region 9 RBCs.	To Be Considered	Guidelines for soil screening levels (SSL) will be considered as remediation goals for the remedy at OU 6.

North Carolina Location-Specific ARARs and TBCs
Operable Unit 6, Site 12
MCAS Cherry Point, North Carolina

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comment
Solid Waste Management **[NCGS §130A]**					
Presence of an inactive hazardous substance or waste disposal site	A survey plat must be prepared and certified by a professional land surveyor. The Notice shall include a legal description of the site that would be sufficient as a description in an instrument of conveyance, shall meet the requirements for maps and plats, and shall identify: (1) The location and dimensions of the disposal areas and areas of potential environmental concern with respect to permanently surveyed benchmarks, (2) The type, location, and quantity of hazardous substances known by the owner of the site to exist on the site, and (3) Any approved restriction on the current or future use of the site. After the notice is approved and certified, a certified copy of the Notice shall be filed in the register of deeds' office in the county or counties in which the land is located.	Existence and location of an inactive hazardous substance or waste disposal site.	*NCGS § 130A-310.8*	Applicable	A survey plat will be prepared by a professional land surveyor and recorded with Craven County.

References

Item	Reference Phrase in ROD	Location in ROD	Identification of Referenced Document Available in the Administrative Record[1]
1	Site 12 is the crash-crew training area	Section 2.1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Attachment 2, Section 2.2, Pages 2-1 through 2-3. CH2M HILL, December 2005.
2	hydrogeologic setting	Section 2.2	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 4.3.4.1, Pages 4-10 through 4-13. CH2M HILL, December 2005.
3	constituent concentrations	Section 2.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 5, Tables 5-2 through 5-14. CH2M HILL, December 2005.
4	soil	Section 2.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 5, Figures 5-4 through 5-6. CH2M HILL, December 2005.
5	arsenic	Section 2.3	Groundwater Screening Evaluation, MCAS Cherry Point, OU 6 Site 12. CH2M HILL, May 2006.
6	groundwater	Section 2.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 5, Figure 5-7. CH2M HILL, December 2005.
7	surface water	Section 2.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 5, Figure 5-8. CH2M HILL, December 2005.
8	sediment	Section 2.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 5, Figure 5-9. CH2M HILL, December 2005.
9	samples	Table 1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 3, Tables 3-6 through 3-10. CH2M HILL, December 2005.
10	samples	Table 1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Attachment 2, Sections 3.1 and 3.2, Pages 3-1 through 3-3. CH2M HILL, December 2005.
11	VOCs and SVOCs were detected	Section 2.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Attachment 2, Tables 2 and 3. CH2M HILL, December 2005.
12	subsurface soil	Section 2.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Attachment 2, Figure 6. CH2M HILL, December 2005.

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13	groundwater	Section 2.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Attachment 2, Figure 7. CH2M HILL, December 2005.
14	North Carolina's groundwater classification	Section 2.4	North Carolina Administrative Code, Title 15A, Department of Environment, Health and Natural Resources, Subchapter 2L – Groundwater Classification and Standards. Section 200, Rule .0201. NCDENR, April 2005.
15	human health CSM	Section 2.5.1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 7, Figure 7-1. CH2M HILL, December 2005.
16	quantitative human health risk assessment	Section 2.5.1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 7, Tables 7-4, 7-5, and 7-6. CH2M HILL, December 2005.
17	Potential unacceptable risks	Section 2.5.1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 7, Tables 7-10 and 7-11. CH2M HILL, December 2005.
18	no unacceptable risks	Section 2.5.1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Appendix G-1, Tables 9.1 through 9.6. CH2M HILL, December 2005.
19	potential human health risks were further evaluated	Section 2.5.1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Attachment 2, Section 4.4, Pages 4-5 and 4-6 Tables 7.1 and 7.2, Tables 8.1 and 8.2, Tables 9.1 and 9.2, and Tables 10.1 and 10.2. CH2M HILL, December 2005.
20	soil data	Section 2.5.1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Attachment 2, Table 5. CH2M HILL, December 2005.
21	results	Section 2.5.1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Attachment 2, Table 11. CH2M HILL, December 2005.
22	assumptions and uncertainties	Section 2.5.1	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 7.6.1, pages 7-31 through 7-33, Table 7-9. CH2M HILL, December 2005.
23	ecological CSM	Section 2.5.2	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 8, Figure 8-3. CH2M HILL, December 2005.
24	assessment and measurement endpoints	Section 2.5.2	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 8, Table 8-1. CH2M HILL, December 2005.
25	screening values	Section 2.5.2	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 8, Tables 8-2 through 8-4. CH2M HILL, December 2005.
26	reference toxicity values	Section 2.5.2	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 8, Tables 8-5 and 8-6. CH2M HILL, December 2005.
27	chemicals of potential concern	Section 2.5.2	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 8, Tables 8-2 through 8-4 and 8-9 through 8-13. CH2M HILL, December 2005.

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28	refined	Section 2.5.2	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 8.6.1 and 8.6.2, pages 8-14 through 8-18, Tables 8-14 through 8-16, and Tables 8-18 through 8-22. CH2M HILL, December 2005.
29	site use factors	Section 2.5.2	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 8.6.1, pages 8-15 and 8-16. CH2M HILL, December 2005.
30	uncertainty	Section 2.5.2	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 8.6.3, page 8-18. CH2M HILL, December 2005.
31	NC 2Ls	Section 2.5	North Carolina Administrative Code Title 15A Subchapter 2L. 15A NCAC 02L.0202. Department of Environment, Health, and Natural Resources, April 2005.
32	NC SSLs	Section 2.5	Guidelines for Establishing Remediation Goals at RCRA Hazardous Waste Sites. Appendix 2, Appendix 3a, and Appendix 3b. North Carolina Department of Environment and Natural Resources, Division of Waste Management, Hazardous Waste Section, Revised May 2005.
33	groundwater	Section 2.5.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 5, Table 5-9, Attachment 2, Table 3. CH2M HILL, December 2005.
34	soil	Section 2.5.3	Final Remedial Investigation Report, Operable Unit 6, Site 12, Crash Crew Training Area, MCAS Cherry Point, North Carolina. Section 5, Tables 5-2 and 5-7, Attachment 2, Table 2. CH2M HILL, December 2005.
35	eastern United Stated soil	Section 2.5.3	Background Evaluation Report for MCAS Cherry Point, North Carolina. Section 1, Table 1-3. Navy, October 1999.
36	subsurface soil	Section 2.5.4	Final Feasibility Study for Operable Unit 6, MCAS Cherry Point, North Carolina. Section 4, Figure 4-1. CH2M HILL, January 2006.
37	groundwater	Section 2.5.4	Final Feasibility Study Report of Operable Unit 6, MCAS Cherry Point, North Carolina. Section 4, Figure 4-2. CH2M HILL, January 2006.
38	General Response Actions (GRAs) and remedial approaches	Section 2.8	Final Feasibility Study for Operable Unit 6, MCAS Cherry Point, North Carolina. Sections 6.1 and 6.2, Tables 6-1 through 6-4. CH2M HILL, January 2006.
39	preliminary remedial alternatives	Section 2.8	Final Feasibility Study for Operable Unit 6, MCAS Cherry Point, North Carolina. Section 6.3 and Table 6-5. CH2M HILL, January 2006.
40	nine evaluation criteria	Section 2.8.2	Final Feasibility Study for Operable Unit 6, MCAS Cherry Point, North Carolina. Section 7.1, pages 7-1 through 7-4. CH2M HILL, January 2006.
41	ARARs and TBC criteria	Section 2.8.2	Final Feasibility Study for Operable Unit 6, MCAS Cherry Point, North Carolina. Appendix A, Tables A-1 through A-3, CH2M HILL, January 2006.
42	Present-Worth Cost: $291,600	Table 6	Final Feasibility Study for Operable Unit 6, MCAS Cherry Point, North Carolina. Appendix B, Soil Alternative S4. CH2M HILL, January 2006.

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43	**Present-Worth Cost: $229,300**	Table 6	Final Feasibility Study for Operable Unit 6, MCAS Cherry Point, North Carolina. Appendix B, Soil AlternativeS5. CH2M HILL, January 2006.
44	**Present-Worth Cost: $194,300**	Table 6	Final Feasibility Study for Operable Unit 6, MCAS Cherry Point, North Carolina. Appendix B, Groundwater Alternative G4, CH2M HILL, January 2006.
45	**MNA**	Section 2.9.1	Technical Memorandum: Monitored Natural Attenuation (MNA) Evaluation in Groundwater, MCAS Cherry Point, OU 6 - Site 12, CH2M HILL, August 2006.
46	**IR Program website**	Section 2.10	http://public.lantops-ir.org/sites/public/cherrypoint/default.aspx
47	**meeting transcript**	Section 3	Proposed Remedial Action Plan for Site 12, Operable Unit 6 at Havelock Tourist and Event Center Havelock, North Carolina Public Meeting, May 9, 2006.

[1] Bold blue text indicates hyperlinks available on the reference CD to detailed site information contained in the publicly available Administrative Record.

For access to information contained in the Administrative Record for MCAS Cherry Point, please contact:

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